

EXHIBIT 2

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

SAN JOSE DIVISION

RED HAT, INC.,

Plaintiff,

v.

VIRTAMOVE, CORP.,

Defendant.

CASE NO. ~~35:24-CV~~CV-04740-PCP

SUPPLEMENTAL COMPLAINT

~~DEMAND FOR JURY TRIAL~~Jury Trial
Demanded

Judge: Hon. P. Casey Pitts
Courtroom: 8, 4th Floor

NATURE OF THE ACTION

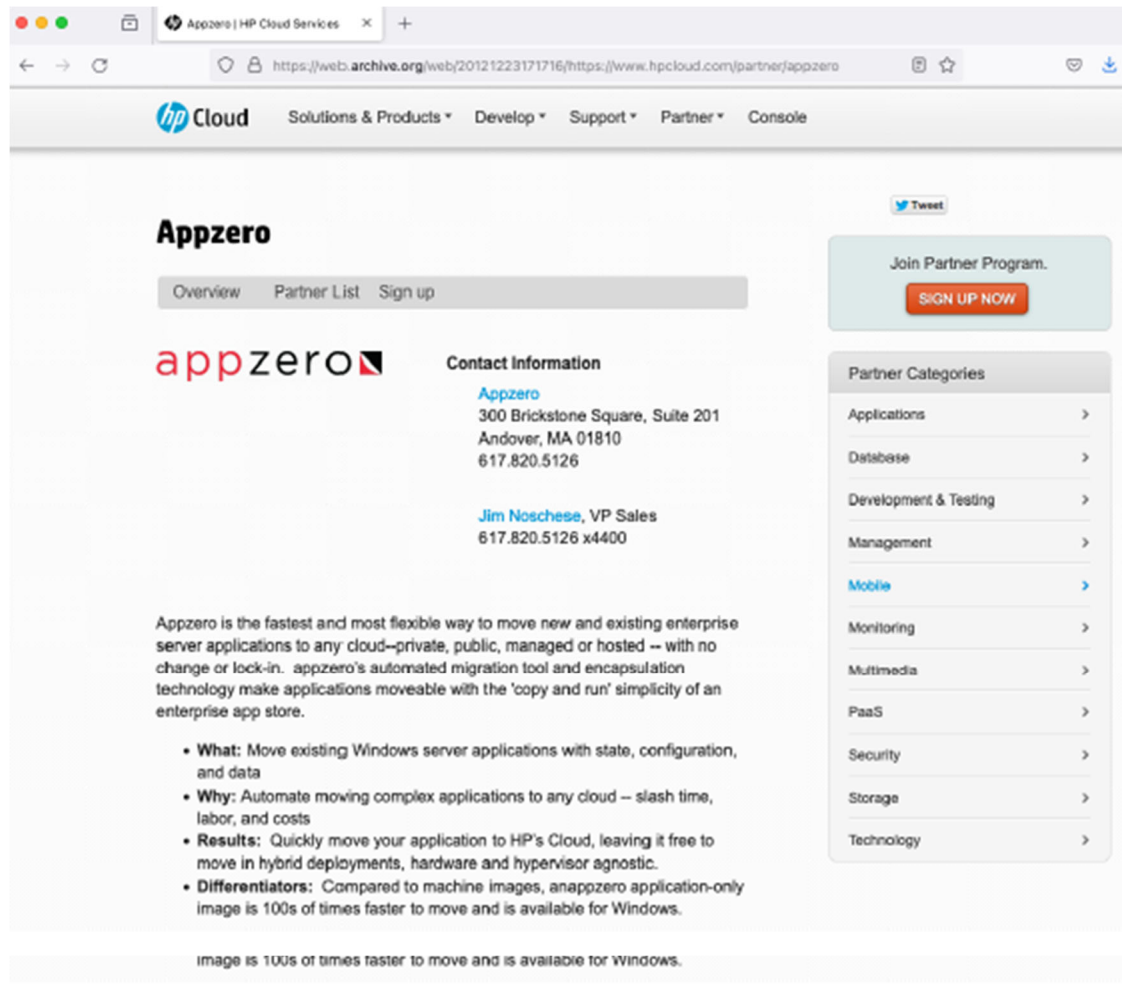
1 1. This is an action for declaratory relief arising under the patent laws of the United States.

2 2. Red Hat, Inc. (“Red Hat”) brings the instant action because Defendant VirtaMove, Corp.
3 (“VirtaMove”) has commenced an aggressive litigation campaign against products relating to open source
4 containerization and container orchestration technology. More specifically, VirtaMove has filed lawsuits
5 against International Business Machines Corp. (“IBM”), Hewlett Packard Enterprise (“HPE”), Google,
6 and Amazon.com Services LLC (“Amazon”), alleging that they infringe United States Patent Nos.
7 7,519,814 (the “’814 patent”) and 7,784,058 (the “’058 patent”) (collectively, the “Asserted Patents”). A
8 true and correct copy of the operative complaints against IBM, HPE, Google, and Amazon are attached
9 as Exs. A-D.
10

11 3. In these lawsuits, VirtaMove accused IBM, HPE, Amazon, and Google for use of their cloud
12 and server computing products that offer containerization and container orchestration technology—
13 including IBM’s Cloud Kubernetes Service, HPE Ezmeral Runtime Enterprise, Google’s Migration to
14 Container, and Amazon Elastic Container Service (“ECS”) (collectively, the “Texas Cases Accused
15 Products”). In its infringement contentions against IBM, HPE, and Google, VirtaMove identified entirely
16 third-party, open source software—namely, Docker containers and the Kubernetes platform—as its basis
17 for concluding that the Texas Cases’ Accused Products infringe. VirtaMove did not accuse or identify
18 OpenShift, Red Hat’s containerization and container orchestration product, of infringing.

19 4. However, Red Hat’s OpenShift uses the same third-party Docker container and Kubernetes
20 technology in its containerization and container orchestration operation. Because VirtaMove effectively
21 concedes that mere use of Docker container and Kubernetes technology to implement containerization
22 and container orchestration is sufficient to infringe its ’814 and ’058 patents, there is a cloud over Red
23 Hat’s products; a threat to Red Hat’s business, its relationships with its customers and partners, and its
24 sales of OpenShift; and a justiciable controversy between Red Hat and VirtaMove.

25 5. Therefore, Red Hat requests relief as follows: a declaratory judgment that Red Hat’s products
26 do not infringe the Asserted Patents because they do not meet each and every limitation of any asserted
27 claim.
28



VirtaMove, Corp. v. Hewlett Packard Enterprise Co., No. 2:24-cv-00093-JRG, Dkt. 40, ¶¶ 10–11 (E.D. Tex. Feb. 9, 2024); *see also* <https://icloud.pe/blog/appzero-adds-three-premier-partners-and-sees-significant-growth/>; https://www.prweb.com/releases/appzero_adds_three_premier_partners_and_sees_significant_growth/prweb11310700.htm.

12. This partnership took place in 2013, prior to the split of Hewlett-Packard into two separate entities, HP Inc. and Hewlett Packard Enterprise (“HPE”). Thus, at the time, this partnership was with HP Inc.

13. HP is, and was in 2013, a California company with its headquarters in Palo Alto, CA, in the Northern District of California. *See* <https://www.hp.com/us-en/hp-information/cwc/ww-briefing-center.html>. Moreover, based on information and belief, VirtaMove representatives met with HP representatives in California to discuss and demonstrate the AppZero technology that VirtaMove claims

1 is covered by the '814 and '058 patents. *VirtaMove, Corp. v. Hewlett Packard Enterprise Co.*, No. 2:24-
2 cv-00093-JRG, Dkt. 40, ¶¶ 10–11 (E.D. Tex. May 13, 2024).

3 14. As another example, in 2015, 2020, and 2021, AppZero met with representatives of Google
4 “for the purposes of partnering with VirtaMove, demonstrating AppZero, training Google on how to use
5 AppZero, allowing Google to run and evaluate AppZero, discussing integration of AppZero into Google
6 cloud, and sharing materials about how AppZero works,” and that Google allegedly “would have learned
7 that AppZero was patented” at that time. *See VirtaMove, Corp. v. Google LLC*, No. 7:24-cv-00033-DC-
8 DTG, Dkt. 27, ¶ 10 (W.D. Tex. May 21, 2024). Google is a California company with its headquarters in
9 Mountain View, CA, in the Northern District of California. *Id.*, ¶ 6. Based on information and belief, this
10 demonstration of the VirtaMove technology purportedly underlying the Asserted Patents and discussion
11 meetings between AppZero and Google took place in the Northern District of California.

12 15. Likewise, VirtaMove has established and maintains strategic partnerships and relationships
13 with companies in Northern California. For example, on April 15, 2020, VirtaMove announced a
14 “Strategic Partnership” with the company CloudPhysics “to Accelerate Application Modernization.” *See*
15 [https://virtamove.com/blog/virtamove-and-cloudphysics-co-announce-strategic-partnership-to-](https://virtamove.com/blog/virtamove-and-cloudphysics-co-announce-strategic-partnership-to-accelerate-application-modernization/)
16 [accelerate-application-modernization/](https://virtamove.com/blog/virtamove-and-cloudphysics-co-announce-strategic-partnership-to-accelerate-application-modernization/). That same announcement explains that CloudPhysics is
17 “[h]eadquartered in Santa Clara, CA,” in the Northern District of California. On information and belief,
18 through CloudPhysics’ use of VirtaMove’s application virtualization products as part of the strategic
19 partnership and offering to joint customers, CloudPhysics was granted an express or implied license to
20 use VirtaMove’s application virtualization patents, including the '814 and '058 patents.

21 16. VirtaMove also purposefully utilizes California servers for VirtaMove’s product V-Migrate
22 to use, sell, offer for sale, license, and/or distribute V-Migrate for and to California customers. For
23 example, VirtaMove markets V-Migrate to customers as a solution intended “to move legacy workloads
24 to the Cloud,” and specifically the AWS Cloud, provided by Amazon. *See*
25 <https://virtamove.com/blog/virtamove-partners-with-aws-launches-saas-in-aws-marketplace/>. The AWS
26 US West (Northern California) Region server location is in the Northern District of California. *See*
27 https://aws.amazon.com/about-aws/global-infrastructure/regions_az/. On information and belief,
28 VirtaMove knows that these servers are located in the Northern District of California and purposefully

1 makes use of these server locations to use, sell, offer for sale, license, and/or distribute V-Migrate for and
2 to customers in California.

3 17. On information and belief, AppZero also partnered with the company OpSource, Inc. to host
4 VirtaMove's application virtualization products. See [https://www.varinsights.com/doc/opsources-](https://www.varinsights.com/doc/opsources-introduces-opsources-partner-0001)
5 [introduces-opsources-partner-0001](https://www.varinsights.com/doc/opsources-introduces-opsources-partner-0001). OpSource maintains server locations in Santa Clara, CA, in the
6 Northern District of California, used by VirtaMove as part of this partnership. See
7 <https://www.datacenterdynamics.com/en/news/opsources-launches-santa-clara-data-center/>.

8 18. VirtaMove has additional contacts with the forum, including contacts relating to its efforts to
9 license, enforce, and sell products allegedly embodying its patents. For example, members of
10 VirtaMove's Board are based in Northern California, including at least Scott Munro, who is also a director
11 of VirtaMove with fiduciary duties and obligations. See Ex. E (VirtaMove Corporate Profile). The
12 VirtaMove representative who purportedly met with the defendants to "discuss and demo AppZero and
13 its technology for either partnership use, distribution, and/or investment" is, on information and belief,
14 Greg O'Connor, who at the time was the CEO of AppZero. Mr. O'Connor resides in the Northern District
15 of California. And the attorneys and law firm VirtaMove hired to enforce its patents are located in
16 California.

17 19. Red Hat OpenShift, the product imminently threatened with patent infringement litigation,
18 was developed, in part, in the Northern District of California, and many of Red Hat's OpenShift customers
19 are also based in the Northern District of California. And as explained above, VirtaMove's infringement
20 allegations are directed primarily to the use of technologies, such as Kubernetes and Docker, that were
21 likewise developed and that are maintained in the Northern District of California. In particular, California-
22 based Google launched Kubernetes as an open source project based on Google's work on Borg, which
23 was likewise developed at Google in California. Kubernetes was placed under the governance of the
24 Cloud Native Computing Foundation ("CNCF"), which is a part of the Linux Foundation, both located in
25 San Francisco, California. Docker containers were developed in California by Docker, Inc., which is
26 located in San Francisco and Palo Alto, California. In addition, Red Hat implements its ContainerD and
27 CRI-O container engines in its current version of OpenShift. CRI-O is an open source container solution
28 specifically designed to work with Kubernetes and is maintained by the CNCF, just as Kubernetes is,

1 located in San Francisco, CA. ContainerD is an open source container runtime originally developed by
2 Docker but today is also maintained by the CNCF. On information and belief, VirtaMove knows that
3 these companies and technologies are based in California.

4 20. VirtaMove is also registered to do business in California and has a registered corporate agent
5 in California. *See* Ex. F (CA Sec. of State).

6 21. Venue is proper in this District under 28 U.S.C. §§ 1391(b), (c), because a substantial part of
7 the events giving rise to VirtaMove’s claims occurred in this District, and because VirtaMove is subject
8 to personal jurisdiction here.

9 **FACTUAL BACKGROUND**

10 *RED HAT AND ITS OPEN SOURCE SOFTWARE*

11 22. Red Hat is a leading contributor to the open source software community. Although Red Hat
12 makes software available under open source licenses, Red Hat derives revenue from aggregating,
13 certifying, testing, enhancing, packaging, maintaining, supporting, and influencing the future direction of
14 the software, among other value-added offerings. Red Hat remains committed to the open source
15 development model, and many thousands of Red Hat’s employees have contributed and continue to
16 contribute to the open source software ecosystem, including by developing and releasing code under open
17 source licenses. Red Hat believes that the open source development and licensing model offers important
18 advantages for its customers over proprietary software development and licensing models.

19 23. Open source software is software in which the source code is made available to users for
20 inspection, modification, and distribution. Generally, when a computer program is authored, the
21 programmer writes code in a human-readable programming language called “source code.” The source
22 code can be compiled into another form, called “object code,” that is executable by a computer
23 microprocessor. With open source software, the source code itself is made available to the recipient under
24 conditions set forth in an accompanying license, which grants relatively broad rights to recipients to use,
25 copy, modify, and distribute the software, but may also limit the ways in which the code or derivative
26 works of the code can be distributed so as to benefit the broader developer community.

27 24. The benefits of the open source model are widely recognized. For instance, in 2008, the
28 Federal Circuit commented “[o]pen source licensing has become a widely used method of creative

1 collaboration that serves to advance the arts and sciences in a manner and at a pace that few could have
2 imagined just a few decades ago.” *Jacobsen v. Katzer*, 535 F.3d 1373, 1379 (Fed. Cir. 2008).

3 25. One common open source software license is the GNU General Public License (“GPL”). The
4 GPL permits access to human-readable software source code and provides relatively broad rights for
5 licensees to use, copy, modify, and distribute open source software.

6 26. Red Hat is also one of the largest corporate contributors to the Linux kernel, which is a
7 collection of programs at the heart of the Linux operating system. Through this work, Red Hat developed
8 Red Hat Enterprise Linux (“RHEL”), which is a distribution of the Linux operating system designed for
9 enterprise environments. One of the key features of RHEL is its subscription-based model, which provides
10 customers with access to software updates, security patches, and technical support from Red Hat. In
11 November 2019, Red Hat released version 8.1 of RHEL. RHEL contains numerous components which
12 are licensed under the GPL, and other open source licenses.

13 27. For instance, Red Hat OpenShift is a family of containerization software products. One such
14 product is the OpenShift Container Platform, which is a hybrid cloud platform built around Linux
15 containers orchestrated and managed by Kubernetes on a foundation of Red Hat Enterprise Linux.
16 OpenShift is an open source software product made available to third-parties through various open source
17 licenses.

18 28. Because Red Hat provides its products as open source software programs, Red Hat maintains
19 an open source assurance program. When a client obtains certain Red Hat open source software, they
20 enter into the Red Hat Open Source Assurance Agreement. This agreement is designed to protect
21 customers developing and deploying Red Hat solutions. A true and correct copy of this agreement is
22 attached hereto as Exhibit G.

23 *CONTAINERIZATION TECHNOLOGY*

24 29. Containerization software is a technology that allows a user to package and run an application
25 in a portable environment called a container. The container runs as an isolated process on the host
26 operating system, which ensures that the application runs consistently regardless of the environment in
27 which it is deployed.

1 30. The idea for dividing and separating systems and applications within a computing
2 environment is not new. Back in the 1970s, LPARs (Logical Partitions) were developed at IBM as a
3 virtualization technology for mainframe computers, allowing a single physical system to be divided into
4 multiple logical servers. Each of the resulting divided systems ran its own operating system and
5 applications. Containers, similarly, provide a means of virtualization that package cloud-native
6 applications across different computing environments. LPARs were, and are, the foundational technology
7 for providing isolation between applications running on the same physical or virtual system, providing the
8 user efficiency and flexibility.

9 31. Early iterations of containerization software products include Thinstall (now known as
10 ThinApp), FreeBSD, Virtuozzo, and Solaris, all developed in NDCA, and Zap, developed at Columbia
11 University.

12 32. In the early 2000's, Google engineers in Mountain View, CA, developed the project Borg,
13 which outlined the principles and design of a container orchestration system. In 2014, Google announced
14 the launch of Kubernetes as an open source project based on Google's work on Borg. Shortly thereafter,
15 Kubernetes was placed under the governance of the Cloud Native Computing Foundation ("CNCF"),
16 which is a part of the Linux Foundation, both located in San Francisco, CA. Like Red Hat OpenShift,
17 Kubernetes is an open source software program available under various open source licenses and as such,
18 is the result of collaborative efforts of the open source community.

19 33. Around this same time, researchers and engineers at the University of California at Berkeley
20 ("Cal") were developing another container orchestration system called Apache Mesos. Mesos also is now
21 an open source software program available under the Apache License 2.0, a widely-used open source
22 license, and as such, is the result of collaborative efforts of the open source community.

23 34. Around this time, Docker, Inc. developed a container orchestration platform called Swarm.
24 The Docker software was first publicly released in Santa Clara, CA in 2013. Docker, Inc. is located in
25 Palo Alto, CA.

26 35. To make use of a container orchestration platform like Kubernetes, Mesos, and Swarm, a
27 software for developing and running applications in containers is required. Popular software programs
28 include Docker, Garda, and Moby (all developed by Docker, Inc. in Palo Alto, California), ContainerD

1 (originally developed by Docker, Inc. but later placed under governance of the CNCF as an open source
2 project), and Red Hat OpenShift.

3 36. Since their inception, Red Hat engineers contributed and continue to contribute to the open
4 source code underlying containerization software products such as Kubernetes and Docker.

5 37. OpenShift was developed by Red Hat as the market began adopting containers and
6 Kubernetes. OpenShift uses Kubernetes as its underlying container orchestration system and Red Hat
7 Enterprise Linux as its operating system. Today, OpenShift is a leading enterprise Kubernetes platform,
8 providing organizations with a solution for building, deploying, and managing cloud-native applications
9 at scale across on-premises data centers, public clouds, and edge environments.

10 38. OpenShift version 1 was released in November 2010. Red Hat released OpenShift as an open
11 source project in May 2012.

12 39. Originally, OpenShift used a custom approach to implementing Linux containers, and did so
13 through version 2 of the product. After version 2, OpenShift shifted to use of Docker containers, along
14 with Kubernetes as its container orchestration system. In version 4 of the product (the current version),
15 Red Hat implemented its ContainerD, CRI-O, and Podman container engines in OpenShift.

16 40. CRI-O is an open source container solution specifically designed to work with Kubernetes. It
17 was originally developed by Red Hat but today is now maintained by the CNCF, just as Kubernetes is,
18 located in San Francisco, CA.

19 41. Podman is likewise an open source container management tool that was developed by Red
20 Hat.

21 42. ContainerD is an open source container runtime originally developed by Docker but today is
22 now maintained by the CNCF. ContainerD is widely used for container orchestration platforms like
23 Kubernetes.

24 43. IBM offers a service to third-party enterprises to manage containerization of their applications
25 called IBM Cloud Kubernetes Service (“IBM Kubernetes”). Initially, IBM partnered with Docker, Inc.
26 to bring containerization technologies to enterprise clients and integrated Docker into its platform. After
27 Docker moved to a more proprietary route, IBM began using Kubernetes and other container platforms
28 such as through the Open-Container Initiative (“OCI”).

1 44. IBM Kubernetes is a service for businesses to manage their containerization, utilizing
2 software developed by third parties such as Kubernetes (developed by CNCF), Docker (developed by
3 Docker, Inc.), and other open source container projects.

4 *RELEVANT RELATED LITIGATION*

5 45. On January 31, 2024, VirtaMove sued IBM in the Eastern District of Texas alleging
6 infringement of the Asserted Patents. See *VirtaMove, Corp. v. Int’l Bus. Machines Corp.*, No. 2:24-cv-
7 00064-JRG (W.D. Tex. Jan. 31, 2024); Ex. I.

8 46. The ’814 patent is titled “System for Containerization of Application Sets.” The ’814 patent
9 is based on application No. 10/939,903 filed on September 13, 2004 and supposedly claims priority to
10 provisional application No. 60/502,619, filed on September 15, 2003. A true and correct copy of the ’814
11 patent is attached hereto as Exhibit J.

12 47. The ’058 patent is titled “Computing System Having User Mode Critical System Elements as
13 Shared Libraries.” The ’058 patent is based on application No. 10/946,536 filed September 21, 2004 and
14 supposedly claims priority to provisional application No. 60/504,213, filed on September 22, 2003. A
15 true and correct copy of the ’058 patent is attached hereto as Exhibit K.

16 48. The named inventors for both Asserted Patents are Donn Rochette, Paul O’Leary, and Dean
17 Huffman. On information and belief, Mr. Rochette currently resides in Ohio and Mr. O’Leary and Mr.
18 Huffman in Ottawa, Canada. The Asserted Patents are assigned to Trigence Corp., an Ottawa, Canada
19 corporation. On information and belief, Trigence was later acquired by or merged with Appzero, which
20 later became VirtaMove.

21 49. In its May 29, 2024 Second Amended Complaint against IBM, VirtaMove alleged IBM’s
22 Kubernetes infringed the Asserted Patents, focusing exclusively on functionality provided by third-party
23 software Kubernetes and Docker. A true and correct copy of those infringement contentions is attached
24 hereto as Ex. A at Exhibits 2 and 4.

25 50. Around the same time VirtaMove sued IBM, VirtaMove also sued Amazon, Google, and HPE
26 alleging infringement of the same Asserted Patents. On January 26, 2024, VirtaMove sued Amazon in
27 WDTX alleging infringement by Amazon’s AWS End-of-Support Migration Program (“EMP”) and
28 Elastic Container Service (“ECS”). *VirtaMove, Corp. v. Amazon.com, Inc.*, No. 7:24-cv-00030, Dkt. 1

(W.D. Tex. Jan. 26, 2024) (“*Amazon Case*”). On January 31, 2024, VirtaMove sued Google in WDTX alleging infringement by Google’s Migrate to Containers service. *VirtaMove, Corp. v. Google LLC*, No. 7:24-cv-00033, Dkt. 1 (W.D. Tex. Jan. 31, 2024) (“*Google Case*”). And on February 9, 2024, VirtaMove sued HPE in EDTX alleging infringement by HPE’s Ezmeral Runtime Enterprise. *VirtaMove, Corp. v. Hewlett Packard Enterprise Co.*, No. 2:24-cv-00093-JRG, Dkt. 1 (E.D. Tex. Feb. 9, 2024) (“*HPE Case*”). All of VirtaMove’s infringement allegations in these matters are based on the use of Kubernetes and Docker containers.

51. At a high-level, and based on Red Hat’s understanding of VirtaMove’s contentions without conceding the scope or functionality of the Asserted Patents, VirtaMove’s infringement allegations are directed at two features: (1) Containerizing applications and their dependencies; and (2) Deploying the resulting containers across a network infrastructure. Red Hat OpenShift uses the same open source components accused of infringement in IBM, HPE, Amazon, and Google’s products—Docker containers (or containers generally) and Kubernetes. VirtaMove is aware of this. Indeed, in a June 8, 2020 blog post on VirtaMove’s own website, VirtaMove explains that OpenShift is “an evolution of the Kubernetes Enterprise 1.17 platform. OpenShift Container Platform is a cloud development Platform as a Service (PaaS) built around Docker containers. The platform is orchestrated and managed by Kubernetes on a foundation of Red Hat Enterprise Linux. It offers a cloud foundation for building, deploying, and scaling new containerized applications.”

Red Hat OpenShift 4.4 Opens a World of Possibility

In Spring 2020, Red Hat released OpenShift 4.4., an evolution of the Kubernetes Enterprise 1.17 platform. **OpenShift Container Platform** is a cloud development Platform as a Service (PaaS) built around Docker containers. The platform is orchestrated and managed by **Kubernetes** on a foundation of Red Hat Enterprise Linux. It offers a cloud foundation for building, deploying, and scaling new containerized applications. It’s particularly attractive for IT shops interested in developing cloud-enabled micro services.

Red Hat believes that companies need faster and more widespread access to essential apps and services. IT departments are pressured to become ever more agile to deliver innovative solutions. **According to Red Hat**, this landscape translates to “container and Kubernetes-powered open hybrid cloud”. A **preferred path** in the enterprise cloud adoption journey is “application platforms supporting an architecture that gives developers a wide choice of components across hybrid cloud infrastructure.”

At VirtaMove, we’re also intrigued by new applications such as OpenShift, believing that we can use them to containerize legacy applications and retro fit them for load balancing and service architectures.

Containerization boasts many benefits, chiefly among these accelerating the development and deployment of apps on cloud infrastructure. Both Kubernetes and OpenShift promise easy container management.

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See <https://virtamove.com/blog/shift-to-the-future-now/>.

52. Furthermore, VirtaMove has previously recognized that Red Hat OpenShift "is built around Docker containers" and "offers a cloud foundation for building, deploying, and scaling new containerized applications." <https://virtamove.com/blog/shift-to-the-future-now/>. Indeed, "building, deploying, and scaling new containerized applications" is not unique to Red Hat OpenShift, but rather a central feature in each of the products VirtaMove has accused of infringing.

53. VirtaMove's infringement contentions against IBM, HPE, Google, and Amazon could have just as easily been levied against Red Hat OpenShift without altering any of their substance.

54. For example, VirtaMove's infringement contentions against all four of the Defendants identify the use of Docker containers—specifically, the use of Dockerfiles and Docker images to create Docker containers—as infringing the Asserted Patents. Red Hat's OpenShift likewise offers Docker containers by building container images from Dockerfiles to create Docker images.

Building a simple container

You have an idea for an application and you want to containerize it.

First you require a tool for building a container, like buildah or docker, and a file that describes what goes in your container, which is typically a [Dockerfile](#).

Next, you require a location to push the resulting container image so you can pull it to run anywhere you want it to run. This location is a container registry.

Some examples of each of these components are installed by default on most Linux operating systems, except for the Dockerfile, which you provide yourself.

The following diagram displays the process of building and pushing an image:

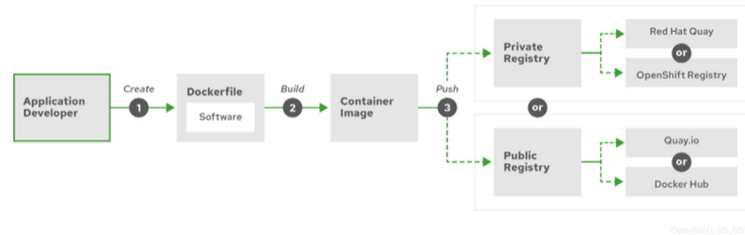


Figure 1. Create a simple containerized application and push it to a registry

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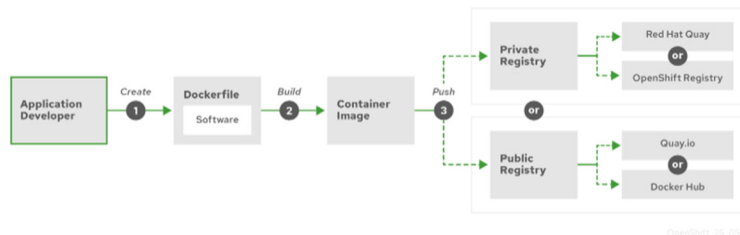


Figure 1. Create a simple containerized application and push it to a registry

<https://docs.openshift.com/container-platform/4.15/architecture/understanding-development.html>

55. As another example, for the limitation of the '814 patent requiring "storing in memory accessible to at least some of the servers a plurality of secure containers of application software, each container comprising one or more of the executable applications and a set of associated system files required to execute the one or more applications, for use with a local kernel residing permanently on one

the servers,” based on Red Hat’s understanding of VirtaMove’s contentions, without conceding the scope or functionality of the Asserted Patents, VirtaMove relies on IBM’s use of application containers, which are based on Docker images created from Dockerfiles, in a Kubernetes environment. *See, e.g.,* Ex. L (VirtaMove’s ’814 IBM Infringement Chart) at 9-22 (“For example, IBM Cloud Kubernetes stores **application containers, sometimes called Docker containers, container images, Kubernetes containers, or Kubernetes pods, in persistent storage available to each node running the application.** The container might be in a format defined by the Open Container Initiative. This storage may be physically attached to the server or connected through any supported interconnect, including over a network. Each container includes the application software as well as a Linux user space required to execute the application, for example libc/glibc and other shared libraries, configuration files, etc. necessary for the application. For example, the container includes a base OS image, provided by IBM or by a third party, such as a CentOS, RHEL, or Ubuntu base image. The container is compatible with the host kernel, for example because the container libraries are linked against the Linux kernel, and the supported host operating systems also use the Linux kernel, which has a stable binary interface.”) (emphasis added); Ex. C at Exhibit 2 (Google ’814 Infringement Chart) at 5-7 (identifying the use of containers); Ex. B at Exhibit 2 (HPE ’814 Infringement Chart) at 4-8 (identifying the use of Docker containers in a Kubernetes environment). While Red Hat disputes that these features (and all of its features) infringe VirtaMove’s patents, all of the IBM features accused by VirtaMove are likewise offered in/supported by Red Hat OpenShift. With respect to Amazon, VirtaMove identifies “packaging of the application and its dependencies” and “migration [of that package] to [a new] environment.” *See* Ex. D at Exhibit 2 (Amazon ’814 Infringement Chart) at 4-6. Again, these identified Amazon features are also offered in/supported by Red Hat OpenShift. And just as that “package” is migrated to a new environment, containers in Red Hat OpenShift can be migrated to new environments. https://docs.redhat.com/en/documentation/openshift_container_platform/4.15/html-single/migration_toolkit_for_containers/index#about-mtc.

56. As another example, for the limitation of the ’814 patent requiring “containers of application software excluding a kernel,” based on Red Hat’s understanding of VirtaMove’s contentions, without conceding the scope or functionality of the Asserted Patents, VirtaMove relies on the Texas Cases Accused Products’ use of containerization technology. *See, e.g.,* Ex. L (VirtaMove’s ’814 IBM Infringement

Chart) at 22-24 (identifying the use of containers); Ex. C at Exhibit 2 (Google '814 Infringement Chart) at 9-10 (identifying the use of containers in a Kubernetes environment); Ex. B at Exhibit 2 (HPE '814 Infringement Chart) at 9-10 (identifying the use of Docker containers); Ex. D at Exhibit 2 (Amazon '814 Infringement Chart) at 4-6 (identifying “packaging of the application and its dependencies” and “migration [of that package] to [a new] environment,” which describe the function of containers and Kubernetes).

Claim 1	Accused Instrumentalities
	<p>Containers are often referred to as “lightweight,” meaning they share the machine’s operating system kernel and do not require the overhead of associating an operating system within each application. Containers are inherently smaller in capacity than a VM and require less start-up time, allowing far more containers to run on the same compute capacity as a single VM. This drives higher server efficiencies and, in turn, reduces server and licensing costs.</p> <p>Containers encapsulate an application as a single executable package of software that bundles application code together with all of the related configuration files, libraries, and dependencies required for it to run. Containerized applications are “isolated” in that they do not bundle in a copy of the operating system. Instead, an open source runtime engine (such as the Docker runtime engine) is installed on the host’s operating system and becomes the conduit for containers to share an operating system with other containers on the same computing system.</p> <p>https://www.ibm.com/topics/containerization</p>

Claim 1	Accused Instrumentalities
	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p><u>Container</u></p> </div> <div style="text-align: center;"> <p><u>Container</u></p> </div> <div style="text-align: center;"> <p><u>Container</u></p> </div> </div> <p style="text-align: center;">Containers share the same base Kernel</p> <p>https://ibm.github.io/kube101/</p>

<https://ibm.github.io/kube101/>

Ex. L (VirtaMove’s ’814 IBM Infringement Chart) at 26-27 (identifying the use of containers). Red Hat OpenShift uses the same containerization technology that VirtaMove accuses of infringement. *See, e.g.,* https://docs.openshift.com/container-platform/4.15/openshift_images/index.html (“The basic units of OpenShift Container Platform applications are called containers.”).

57. As yet another example, in the limitation of the ’814 patent requiring “wherein each of the containers has a root file system that is different from an operating system’s root file system[,]” based on Red Hat’s understanding of VirtaMove’s contentions, without conceding the scope or functionality of the Asserted Patents, VirtaMove relies on the Texas Cases Accused Products’ use of Dockerfiles to build Docker images comprising an application and its dependencies, which can then run in a Kubernetes environment as a container, as well as IBM’s use of Open Container Initiative (“OCI”) images. *See, e.g.,* Ex. L (VirtaMove’s ’814 IBM Infringement Chart) at 36-46; Ex. C at Exhibit 2 (Google ’814 Infringement Chart) at 14-15 (identifying the use of Docker containers and Kubernetes); Ex. B at Exhibit 2 (HPE ’814 Infringement Chart) at 12 (identifying the use of Docker containers); Ex. D at Exhibit 2 (Amazon ’814 Infringement Chart) at 4-6 (identifying “packaging of the application and its dependencies” and “migration [of that package] to [a new] environment,” which describe the function of containers and Kubernetes), 11 (“The package contains both the file and registry data of the packaged application, and the EMP binaries and configuration files that are required to deploy and run the packaged application.”). The IBM features accused by VirtaMove are features offered in and supported by Red Hat OpenShift. *See, e.g.,* Ex. H https://docs.openshift.com/container-platform/4.15/openshift_images/index.html (“Containers in OpenShift Container Platform are based on OCI- or Docker-formatted container images . . . You can use . . . [D]ocker CLI directly to build images.”); <https://docs.openshift.com/container-platform/4.15/architecture/understanding-development.html> (describing the process of building a container, which includes the steps of creating a Dockerfile and building a container image using Docker commands).

58. As another example, for the limitation of the ’058 patent requiring “a shared library having shared library critical system elements (SLCSEs) stored therein for use by the plurality of software

1 applications in user mode[,]” based on Red Hat’s understanding of VirtaMove’s contentions, without
2 conceding the scope or functionality of the Asserted Patents, VirtaMove relies on the Texas Cases Accused
3 Products’ use of Dockerfiles to build Docker images comprising an application and its dependencies,
4 which can later be deployed in a Kubernetes environment as containers, as well as IBM’s use of OCI
5 images. *See, e.g.*, Ex. L (VirtaMove’s ’058 IBM Infringement Chart) at 5-18; Ex. C at Exhibit 4 (Google
6 ’058 Infringement Chart) at 7-12 (“For example, Migrate to Containers automatically generates a
7 **container image**, a **Dockerfile** . . . **Kubernetes deployment** . . .”); Ex. B at Exhibit 4 (HPE ’058
8 Infringement Chart) at 5-7 (“These containers are based on **Docker** . . . The idea of containerization is to
9 isolate and **package the application with all the dependencies in a container.**”); Ex. D at Exhibit 4
10 (Amazon ’058 Infringement Chart) at 3-4 (“Amazon ECS uses Docker images.”). Even more so than the
11 ’814 patent, VirtaMove’s ’058 infringement contentions universally – for all Texas Cases Accused
12 Products – identify the use of Dockerfiles, Docker images, and Docker containers. Indeed, VirtaMove’s
13 accusations further suggest that packaging an application with its dependencies is all that is required to
14 infringe the limitations of the ’058 patent. Based on Red Hat’s understanding of VirtaMove’s contentions,
15 without conceding the scope or functionality of the Asserted Patents, Red Hat OpenShift uses the same
16 open source technology that VirtaMove accuses of infringement.

17 59. Despite not naming Red Hat’s OpenShift as an accused product in any of the above cases,
18 VirtaMove’s infringement allegations—focused on the use and deployment of Kubernetes, Docker, and
19 other open source software programs—against the same containerization and container orchestration
20 technologies used in OpenShift create a justiciable controversy between Red Hat and VirtaMove. Indeed,
21 VirtaMove has initiated litigation against IBM, HPE, Amazon, and Google alleging that the same
22 containerization and container orchestration technology—*e.g.*, use of containers and Kubernetes to build,
23 manage, and deploy containerized applications in network infrastructures—infringes two VirtaMove
24 patents. Red Hat OpenShift allows for building container base images comprising an application and its
25 dependencies from Dockerfiles, deploying those images into servers to run as containers, and using
26 Kubernetes as a container orchestration platform. Based on the accusations against the existing
27 Defendants, which are directed at technology used in Red Hat’s OpenShift, it is not a matter of “if”
28 VirtaMove will bring an action against Red Hat accusing OpenShift of infringement, but “when.”

VIRTAMOVE'S MOST RECENT LAWSUITS CONFIRM ITS INTENT TO ENFORCE THE ASSERTED PATENTS AGAINST RED HAT'S OPENSIFT

60. On December 20, 2024—a little over a week after the Court’s hearing on VirtaMove’s motion to dismiss—VirtaMove extended its litigation campaign against the same containerization and container orchestration technologies used in Red Hat’s OpenShift by asserting the same ’814 and ’058 Patents against Microsoft Corporation (“Microsoft”) and Oracle Corporation (“Oracle”) in the Western District of Texas. *See* Ex. M (*VirtaMove, Corp. v. Microsoft Corp.*, Case No. 7:24-cv-00338 (W.D. Tex. Dec. 20, 2024)); Ex. N (*VirtaMove, Corp. v. Oracle Corp.*, Case No. 7:24-cv-00338 (W.D. Tex. Dec. 20, 2024)). As with VirtaMove’s infringement contentions against IBM, HPE, Google, and Amazon, VirtaMove’s newest infringement contentions against Microsoft and Oracle focus on the same use and deployment of Kubernetes, Docker, and other open source software programs and could have just as easily been levied against Red Hat OpenShift without altering any of their substance. Moreover, the “Accused Instrumentalities” identified in VirtaMove’s recently-filed contentions encompass Microsoft and Oracle’s distribution and/or use of RedHat’s OpenShift itself, further confirming that Red Hat and its OpenShift product are squarely in VirtaMove’s crosshairs.

61. First, based on Red Hat’s understanding of VirtaMove’s contentions (and without conceding the scope or functionality of the Asserted Patents), VirtaMove’s newest lawsuits against Microsoft and Oracle target the sale and use of the same application containerization and container orchestration technologies used in Red Hat’s OpenShift. For example, VirtaMove’s infringement contentions against Microsoft and Oracle identify the use of Docker containers—specifically, the use of Dockerfiles and Docker images to create Docker containers in a Kubernetes environment—as infringing the Asserted Patents. *See, e.g.*, Ex. M (Microsoft Compl. Ex. 2) at 7-9, 14-16, 24-28, 36-37, 41-43, 46-48, 52, 55-57, 60-64; Ex. M (Microsoft Compl. Ex. 4) at 7-18, 22-27, 33-35, 40-43, 47; Ex. N (Oracle Compl. Ex. 2) at 6-18, 25-34, 36-48; Ex. N (Oracle Compl. Ex. 4) at 6-20, 28-31, 38-40, 44. Indeed, the infringement charts attached to VirtaMove’s complaints against Microsoft and Oracle rely on figures and text about Kubernetes and Docker containerization that are identical to the figures and text VirtaMove relies on in its infringement contentions against IBM, Amazon, Google, and HPE. *See, e.g.*, Ex. M (Microsoft Compl. Ex. 2) at 24-34, 55-57, 62-71; Ex. M (Microsoft Compl. Ex. 4) at 8, 10-20, 23-31, 40, 47; Ex. N (Oracle

1 Compl. Ex. 2) at 9, 14-24, 35, 39-41, 45-54; Ex. N (Oracle Compl. Ex. 4) at 13, 16-37, 42-44. While Red
 2 Hat disputes that these features (and all of Red Hat's features) infringe VirtaMove's patents, the features
 3 accused by VirtaMove for each element in its infringement charts are likewise offered in and supported
 4 by Red Hat OpenShift. As in its complaints against IBM, Amazon, Google, and HPE, VirtaMove's
 5 infringement contentions against Microsoft and Oracle confirm that VirtaMove is accusing the
 6 containerization and container orchestration features provided by Kubernetes and Docker, without regard
 7 or dependence on a particular implementation of those features by either company.

8 62. Second, in addition to accusing same Kubernetes and Docker containerization technology
 9 used in Red Hat's OpenShift, based on Red Hat's understanding of VirtaMove's contentions, VirtaMove
 10 accuses Microsoft and Oracle's respective sale and/or use of Red Hat's OpenShift product itself as
 11 infringing the Asserted Patents.

12 63. In its complaint against Microsoft, VirtaMove identifies the "Accused Instrumentalities" as
 13 "Microsoft products and services *using secure containerized applications, including without limitation*
 14 Azure Kubernetes Service ("AKS"), Azure Arc-enabled Kubernetes, Azure Container Registry, and Azure
 15 Container Apps, and *all versions and variations thereof* since the issuance of the asserted patent." Ex. M
 16 (Microsoft Compl. Ex. 2) at 1 (emphasis added); see also Ex. M (Microsoft Compl. Ex. 4) at 1 (identifying
 17 "Microsoft products and services using user mode critical system elements as shared libraries including
 18 without limitation Azure Kubernetes Service ("AKS"), Azure Arc-enabled Kubernetes, Azure Container
 19 Registry, and Azure Container Apps, and all versions and variations thereof since the issuance of the
 20 asserted patent.").

21 64. Based on VirtaMove's allegations, and without conceding the scope or functionality of the
 22 Asserted Patents, one Microsoft service that "us[es] secure containerized applications" is "Azure Red Hat
 23 OpenShift" ("ARO"). Ex. O (Barrett Decl.) ¶ 3. Azure Red Hat OpenShift is one of Microsoft's other
 24 application containerization services like Azure Kubernetes Service ("AKS"), providing the Kubernetes-
 25 based OpenShift platform (along with its application containerization and Docker management features
 26 accused by VirtaMove) to customers through Microsoft's Azure system. Ex. O (Barrett Decl.) ¶ 3. Azure
 27 Red Hat OpenShift is "jointly engineered, operated, and supported by Red Hat and Microsoft to provide
 28 an integrated support experience," further providing "highly available, fully managed OpenShift clusters

on demand, monitored and operated jointly by Microsoft and Red Hat.” Ex. P (<https://learn.microsoft.com/en-us/azure/openshift/intro-openshift>); Ex. Q (<https://azure.microsoft.com/en-us/products/openshift>); Ex. O (Barrett Decl.) ¶ 3. And just like the OpenShift product that Red Hat offers directly to its customers, “Kubernetes is at the core of [the] Red Hat OpenShift” offering provided by Microsoft. Ex. Q (<https://azure.microsoft.com/en-us/products/openshift>).

65. VirtaMove’s complaint against Microsoft does nothing to exclude OpenShift from its identified “Accused Instrumentalities,” that according to VirtaMove include, “without limitation,” any “Microsoft products and services using secure containerized applications.” Ex. M (Microsoft Compl. Ex. 2) at 1. On information and belief, VirtaMove is aware that the Azure Red Hat OpenShift is a “Microsoft product[] and service[] using secure containerized applications” and intends for its contentions to cover Azure Red Hat OpenShift, as those contentions cite to Microsoft webpages that identify Azure Red Hat OpenShift as one of the managed containerization solutions made available in Azure. Compare Ex. M (Microsoft Compl. Ex. 2) at 1 and Ex. M (Microsoft Compl. Ex. 4) at 1 (citing <https://learn.microsoft.com/en-us/azure/aks/what-is-aks>) with Ex. R (<https://learn.microsoft.com/en-us/azure/aks/what-is-aks>) (listing “Azure Red Hat OpenShift” as one of the “managed Kubernetes” container solutions offered by Microsoft). VirtaMove’s affirmative decision to identify the “Accused Instrumentalities” in a way that encompasses Microsoft’s use and distribution of OpenShift, and its refusal to limit such allegations to only Microsoft’s *non-OpenShift offerings*, further confirms the substantial and immediate risk of a suit against Red Hat and further establishes the justiciable controversy between Red Hat and VirtaMove.

66. In its complaint against Oracle, VirtaMove identifies the “Accused Instrumentalities” as “Oracle products and services using secure containerized applications, including without limitation Oracle Cloud Infrastructure (“OCI”) and Oracle Kubernetes Engine (“OCE”) [sic], and all versions and variations thereof since the issuance of the asserted patent.” Ex. N (Oracle Compl. Ex. 2) at 1; see also Ex. N (Oracle Compl. Ex. 4) at 1 (identifying “Oracle products and services using user mode critical system elements as shared libraries, including without limitation Oracle Cloud Infrastructure (“OCI”) and Oracle Kubernetes Engine (“OCE”) [sic], and all versions and variations thereof since the issuance of the asserted patent.”).

67. The Oracle Cloud Infrastructure (“OCI”) identified by VirtaMove as an “Accused Instrumentality” allows customers to deploy and run “Red Hat’s OpenShift container platform” on Oracle’s OCI to create, support, and manage containerized applications (including Docker containers) using OpenShift’s Kubernetes features. Ex. S (<https://www.oracle.com/news/announcement/red-hat-openshift-generally-available-on-oracle-cloud-infrastructure-2024-05-06/>); Ex. T (<https://docs.oracle.com/en-us/iaas/Content/openshift-on-oci/overview.htm>) (“Red Hat OpenShift Container Platform is a cloud-based Kubernetes container platform. Red Hat, in partnership with OCI, supports running cluster workloads on the OCI platform.”); Ex. O (Barrett ¶ 4). This offering was made generally available in May 2024 as part of a “partnership” with Red Hat and is a variation of Oracle’s other containerization solution, “Oracle Kubernetes Engine,” which VirtaMove also identifies as an “Accused Instrumentalit[y].” Ex. M (Microsoft Compl. Ex. 2) at 1; *see also* Ex. M (Microsoft Compl. Ex. 4) at 1. Because VirtaMove does not exclude the use of Red Hat’s OpenShift on Oracle’s OCI platform from the scope of its infringement allegations against Oracle, Red Hat understands that VirtaMove includes the use of OpenShift with the scope of its infringement allegations against Oracle.

68. VirtaMove’s recent affirmative conduct described above demonstrates an intent to enforce the Asserted Patents against Red Hat’s OpenShift product. In its lawsuits against IBM, Amazon, Google, and HPE, VirtaMove accused the same Kubernetes and Docker containerization technology used in Red Hat’s OpenShift. In its most recent lawsuits against Microsoft and Oracle, VirtaMove again incorrectly asserts infringement against that same technology and against use of Red Hat’s OpenShift itself, further establishing a cognizable case and controversy over Red Hat’s claims for declaratory judgment.

RED HAT DOES NOT INFRINGE THE ASSERTED PATENTS

~~60.~~69. Red Hat OpenShift does not directly or indirectly infringe any claim of the Asserted Patents. To the best of Red Hat’s knowledge, no third party infringes any claim of the Asserted Patents by using Red Hat OpenShift. Red Hat has not caused, directed, requested, or facilitated any such infringement, must less with the specific intent to do so. Red Hat OpenShift is not designed for use in any combination which infringes any claim of the Asserted Patents. To the contrary, it is a product with substantial uses that do not infringe any claim of the Asserted Patents.

1 ~~61.70.~~ Among other reasons, Red Hat OpenShift does not infringe the '814 patent because each
2 of the containers in the product do not have a “unique root file system that is different from an operating
3 system’s root file system,” as required by the claims of the '814 patent. Moreover, Red Hat OpenShift
4 does not infringe the '814 patent because it does not practice “each container being mutually exclusive of
5 the other, such that read/write files within a container cannot be shared with other containers,” as required
6 by the remaining claims of the '814 patent.

7 ~~62.71.~~ Among other reasons, Red Hat OpenShift does not infringe the '058 patent because the
8 product does not “store in the shared library . . . functional replicas of OSCSEs,” as required by all claims
9 of the '058 patent. Rather, at build time, the program pulls a container base image from the container
10 registry, upon which application code and application dependencies can be built. More specifically,
11 application code and application dependencies are installed into the container base image. Applications
12 are not accessing a shared library for application dependencies and becoming distinct operating system
13 environments thereafter.

14 **FIRST COUNT**
(Declaration of Non-Infringement of U.S. Patent No. 7,519,814)

15 ~~63.72.~~ Red Hat restates and incorporates by reference all allegations in this Complaint as if fully
16 set forth herein.

17 ~~64.73.~~ VirtaMove claims to own all rights, title, and interest, including the right to seek damages
18 for past, present, and future infringement thereof, in the '814 patent. A true and correct copy of the '814
19 patent is attached hereto as Exhibit J.

20 ~~65.74.~~ In the case VirtaMove has brought against IBM, VirtaMove accuses IBM of infringing the
21 '814 patent based on allegations that focus solely on functionality provided by Kubernetes, Docker, and
22 other open source software—functionalities integrated into Red Hat OpenShift.

23 ~~66.75.~~ A substantial, immediate, and real controversy exists between Red Hat and VirtaMove
24 regarding whether Red Hat OpenShift infringes or has infringed the '814 patent. A judicial declaration is
25 necessary to determine the parties’ respective rights regarding the '814 patent.

26 ~~67.76.~~ Red Hat seeks a judgment declaring that Red Hat OpenShift does not directly or indirectly
27 infringe any claim of the '814 patent. In its complaint, and infringement contentions, against IBM,
28 VirtaMove cites to IBM Kubernetes as purported evidence of infringement of claims 1, 2, 6, 9, and 10 of

the '814 patent. Based on Red Hat's present understanding of claims 1, 2, 6, 9, and 10 of the '814 patent and VirtaMove's allegations, Red Hat OpenShift fails to meet or embody the limitations of claims 1, 2, 6, 9, and 10 of the '814 patent.

SECOND COUNT
(Declaration of Non-Infringement of U.S. Patent No. 7,784,058)

~~68.77.~~ Red Hat restates and incorporates by reference all allegations in this Complaint as if fully set forth herein.

~~69.78.~~ VirtaMove claims to own all rights, title, and interest, including the right to seek damages for past, present, and future infringement thereof, in the '058 patent. A true and correct copy of the '058 patent is attached hereto as Exhibit K.

~~70.79.~~ In the case VirtaMove has brought against IBM, VirtaMove accuses IBM of infringing the '058 patent based on allegations that focus solely on functionality provided by Kubernetes, Docker, and other open source software—functionalities integrated into Red Hat OpenShift.

~~71.80.~~ A substantial, immediate, and real controversy exists between Red Hat and VirtaMove regarding whether Red Hat OpenShift infringes or has infringed the '058 patent. A judicial declaration is necessary to determine the parties' respective rights regarding the '058 patent.

~~72.81.~~ Red Hat seeks a judgment declaring that Red Hat OpenShift does not directly or indirectly infringe any claim of the '058 patent. In its complaint, and infringement contentions, against IBM, VirtaMove cites to IBM Kubernetes as purported evidence of infringement of claims 1, 2, 3, 4, and 18 of the '058 patent. Based on Red Hat's present understanding of claims 1, 2, 3, 4, and 18 of the '058 patent and VirtaMove's allegations, Red Hat OpenShift fails to meet or embody the limitations of claims 1, 2, 3, 4, and 18 of the '058 patent.

PRAYER FOR RELIEF

WHEREFORE, Red Hat prays for judgment and relief as follows:

A. Declaring that Red Hat's products, including OpenShift, do not infringe directly or indirectly any claim of the '814 patent and enjoining VirtaMove, its officers, agents, employees, attorneys, and all persons in active concert or participation with them, from directly or indirectly charging infringement, or instituting further action for infringement, of the '814 patent against Red Hat or any of its customers;

1 B. Declaring that Red Hat's products, including OpenShift, do not infringe directly or indirectly
2 any claim of the '058 patent and enjoining VirtaMove, its officers, agents, employees, attorneys, and all
3 persons in active concert or participation with them, from directly or indirectly charging infringement, or
4 instituting further action for infringement, of the '058 patent against Red Hat or any of its customers;

5 C. Finding that this is an exceptional case under 35 U.S.C. § 285;

6 D. Awarding Red Hat its costs and attorneys' fees in connection with this action; and

7 E. Such further and additional relief as the Court deems just and proper.

8 **JURY DEMAND**

9 Red Hat demands a jury trial on all issues and claims so triable.

10
11 DATED: ~~August 5, 2024~~ January 13, 2025

Respectfully submitted,

12 KIRKLAND & ELLIS LLP

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14 /s/ Todd Friedman

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